

Name \_\_\_\_\_

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

1) What are three ways oxygen sensors can be tested?

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2) How does an oxygen sensor detect oxygen levels in the exhaust?

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3) What is the difference between open-loop and closed-loop engine operation?

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4) How can the oxygen sensor be fooled and provide the wrong information to the PCM?

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5) What is the purpose of a wide band oxygen sensor?

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## Answer Key

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- 1) Oxygen sensors can be tested using a DMM set to read DC volts, a DSO to observe the waveform, or using a scan tool to check for voltage ranges and fuel trim numbers.  
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- 2) An oxygen sensor detects oxygen in the exhaust by comparing the oxygen levels between the exhaust and the outside air.  
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- 3) In open loop, the fuel delivery is provided by the PCM based on a program, whereas in closed loop, changes in the injector pulse width can be made by the PCM based on the signal from the oxygen sensors.  
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- 4) An oxygen sensor can be fooled if there is an exhaust leak upstream from the O2S or if the sensor itself is contaminated.  
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- 5) Wide-band oxygen sensors are used to allow the engine to cover a broader range of air-fuel ratios and allow the vehicle to meet more stringent exhaust emission standards.  
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